Information Technology
for Engineering & Manufacturing

PDM System Integration Case Study

(Further information unavailable.)

Presented by Greg Saul

Greg Saul is an Associate Technical Fellow and the Chief Architect for Boeing Commercial Airplane Group PDM Products & Services. Greg has worked in the PDM domain for the past 6 years leading the architecture for major PDM implementation into BCAG. Greg was a member of the industry review team for OMG PDM Enablers RFP 1. He has held numerous positions during his 13-year Boeing career in the commercial and defense arenas.

PDM System Integration Case Study

Greg Saul

Chief Architect

PDM Products & Services

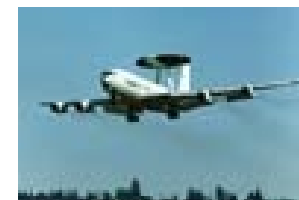Boeing Commercial Airplanes Group
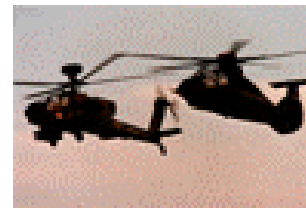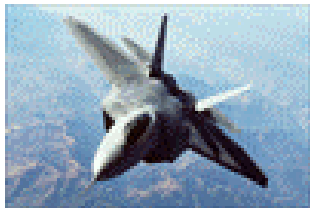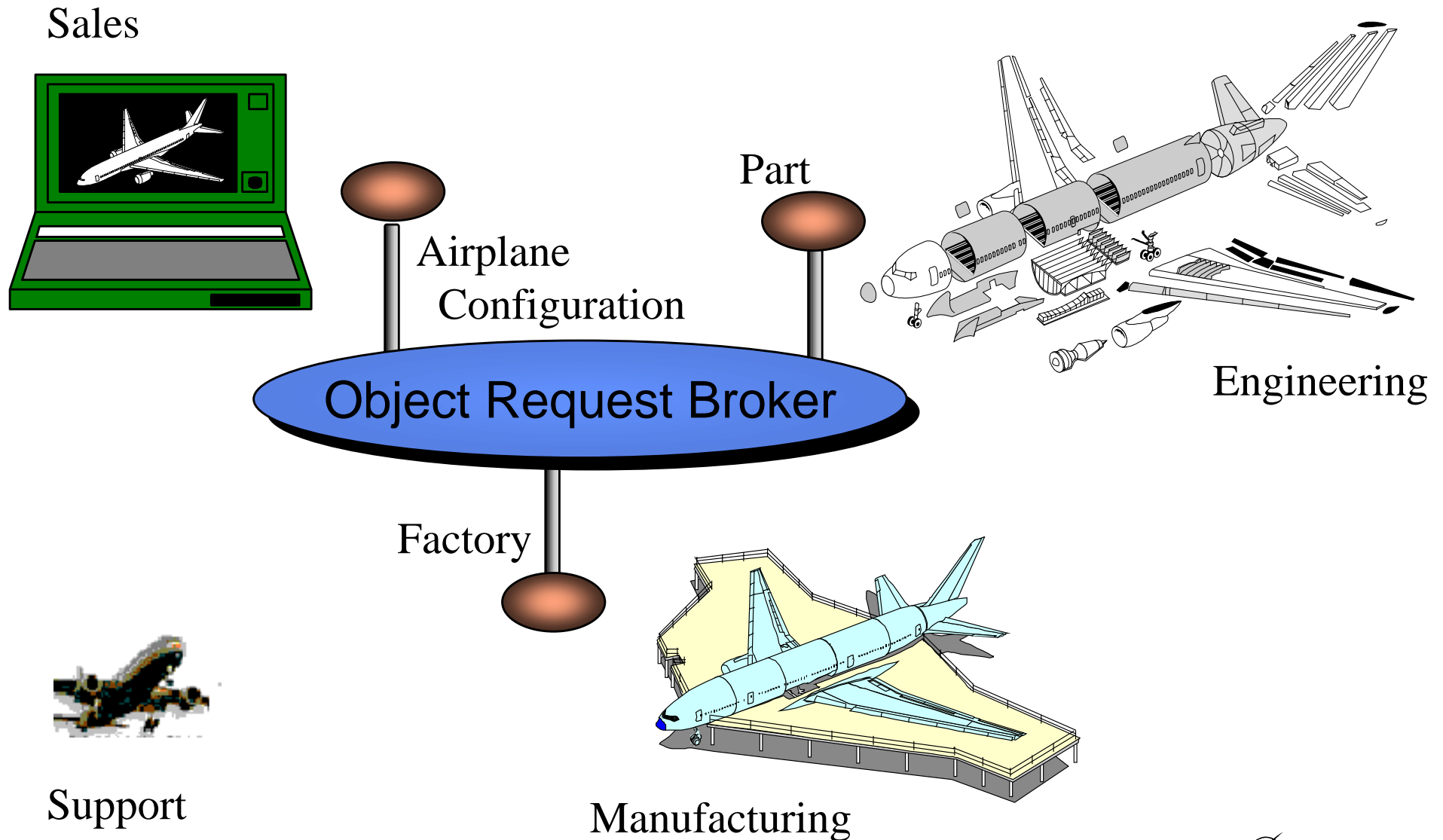
June 2000

Agenda

- Background /Context

- Application Integration

- Process Planning Interface Case Study

- Final Thoughts

The Boeing Company

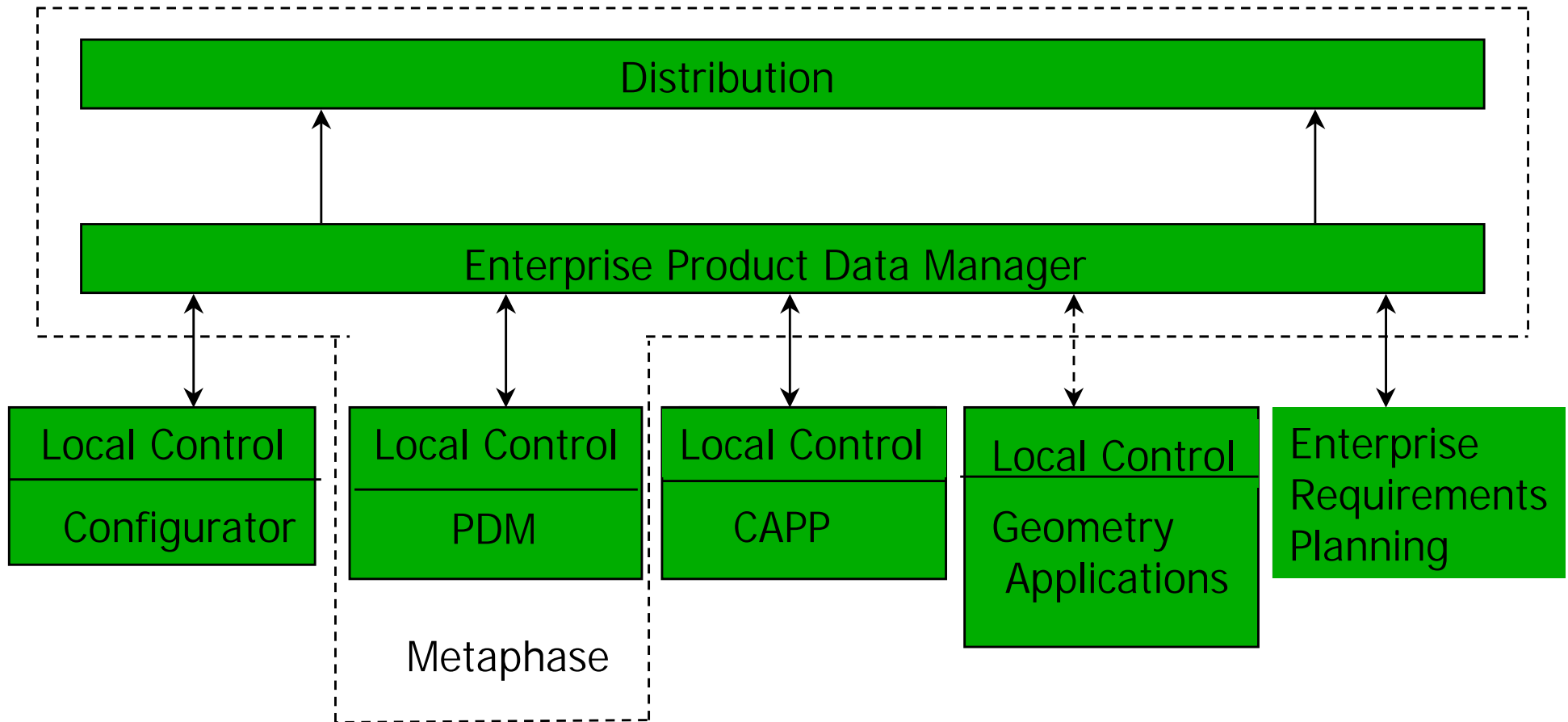- Space and Communications
- Aircraft and Missiles
- Commercial Airplanes

What is DCAC/MRM?

Sales

Part

Airplane
Configuration

Object Request Broker

Engineering

Factory

Support

Manufacturing

BOEING

# Enterprise PDM Architecture

PDM Key Concepts

- ## Fine-Grained Business Objects

  - Capture semantics and intent in attributes and relationships, not just blob vaulting

  - All business objects have form, fit, or function for identification

- ## Configuration Authority Zones defined to support collaborative authoring

- ## Library Management

  - Create a library of reusable designs

- ## Airplane Management

  - Manage lifecycle of the airplane

BOEING®

Process Planning Interface

- Supports the authoring of three plan types and their configuration control in PDM

- Business Process:
  - Create in PDM
  - Author in planning system, with BOM data
  - Store back into PDM

- Size:
  - 8 server side and 2 client side transactions per plan
  - 12 product structure (BOM) queries

BOEING ®

Object Model
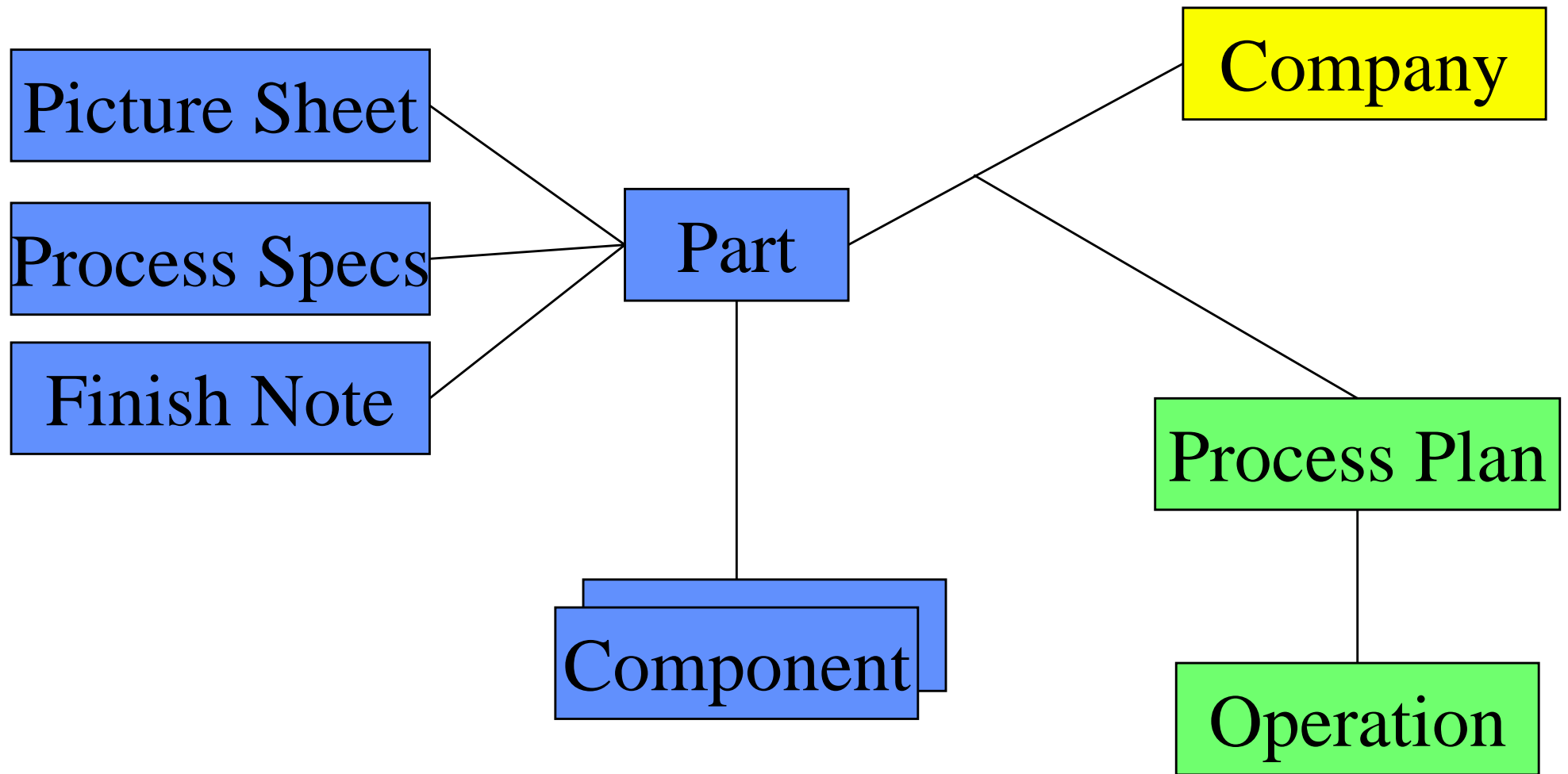
Application Integration Rules

Maximize Data Consistency

Integration Based on Corp. & Industry Stds

Access to App Thru Exposed Interfaces

Loose Coupling (app-app & app-tech)

Minimal Impact to Applications

Access to App Data OnlyThru App

Interface Specification Design Parameters

- High Order Interfaces
  - Strongly typed
  - Convenience methods

- Composite Objects

- Reduce Round Trips

- Synchronous vs. Asynchronous

Specification: Server Side

- Basic object queries
  - latest or approved
  - denormalize relationships or use dynamic attributes

- Relationship expands
  - single, multiple, and ERO

- Author objects
  - create or update, check-in, and state promotion

- Actions
  - check-out, cancel check-out, …

Specification: Client Side

- ## Notifications
  - ### On object event
    - keys, followed by query
    - write file to legacy apps
  - ### Push object shell to client for authoring

- ## Transfers
  - ### Composite object w/ net change to ERP

Check Out Plan Interaction Diagram
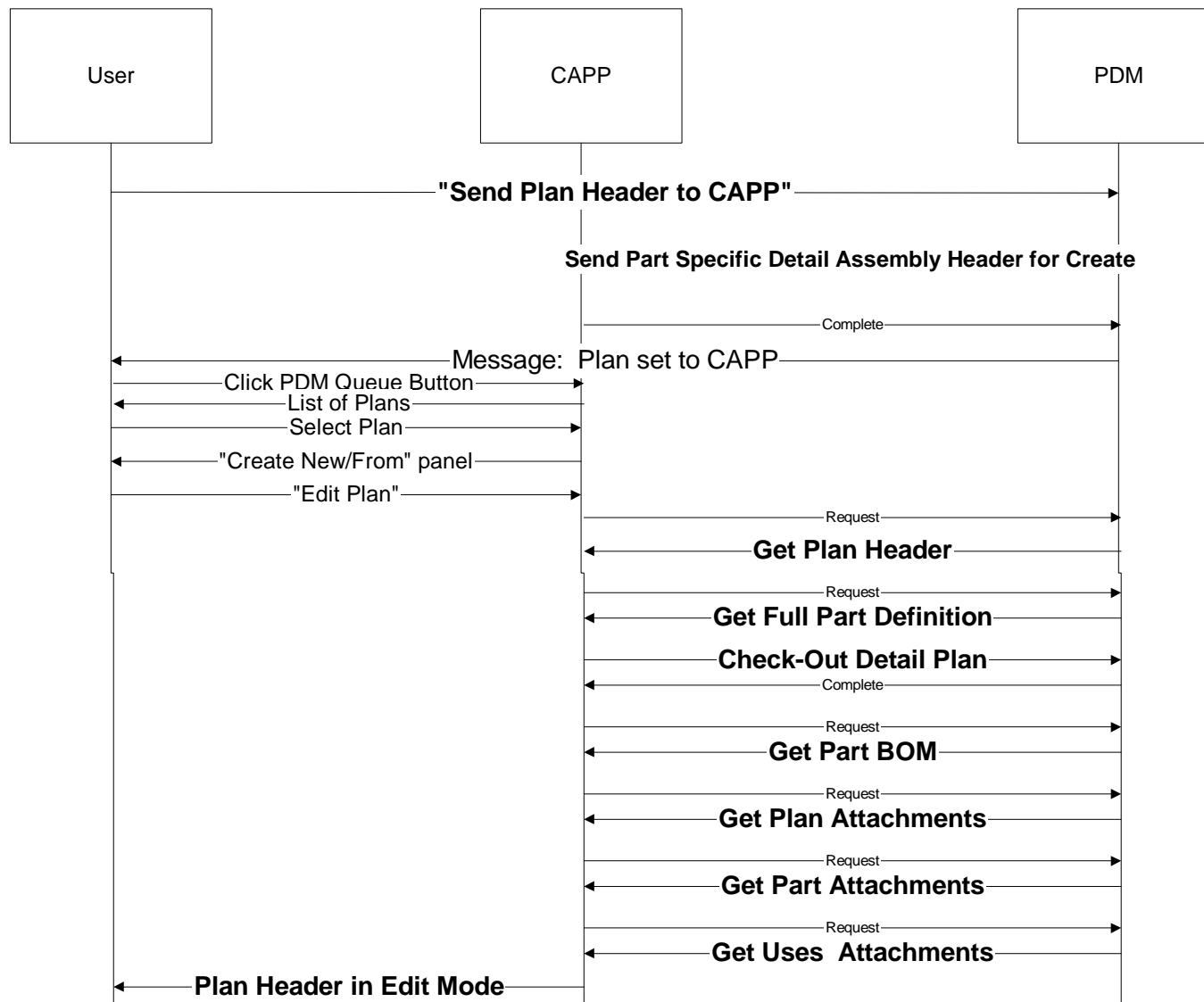
Integration Implementation

- ## Stateless servers
  - Scalability
- ## Pass by value
  - Performance
- ## Insert Boeing quality of service
  - System Management

Implementation: Server Side

- Expose normal methods to CORBA server

- Use of custom integration product

- Write clients to test messages

- Hoped to get more reuse

- Cannot return NULLs

Implementation: Client Side

- Isolated methods to single static server

- "Difficult" to build

- Code sequence:
  - Perform metaphase queries for objects
  - Create IDL sequence
  - Invoke C++ CORBA api
  - Process success / errors

- Test: use environment variable to bypass CORBA calls

BOEING®

Common Challenges Across Boeing

- Increasing complexity
- Increasing diversity and customer expectations
- Slowly maturing processes
- Reduced resources for development and support
- Constant COTS evolution
  - Need to take advantage of new functionality
  - "De-customization"
- Focus on simplification
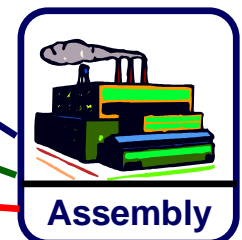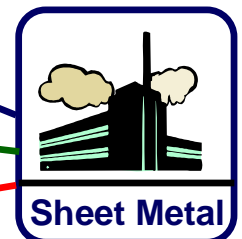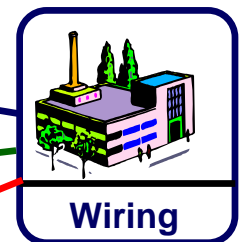
BOEING ®

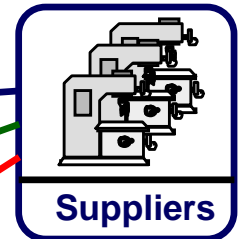# Data Management Problem

Program₁

Program₂

Program₃

Manage and share Information

▸ **Multiple build-package components**

▸ **Multiple data types**

▸ **Multiple usages**

▸ **Multiple delivery mechanisms**

Support transactions across multiple systems

Suppliers

Wiring

Sheet Metal

Assembly

BOEING ®

What We Need

Define

Produce

Program$_1$

Program$_2$

Program$_3$

Common build package format and processes

Standard data types

Uniform delivery architecture

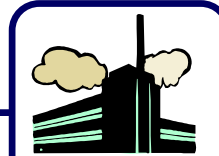**Robust infrastructure**

Standards
Standards
Standards
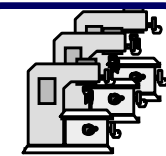
Suppliers

Wiring

Sheet Metal

Assembly

A consistent approach moving forward!

BOEING ®

Questions?

gregory.w.saul@boeing.com